

Further studies on the identification of hairs of some Indian Mammals¹

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(With thirteen text-figures)

Observations on structural hair characteristics of some mammals are undertaken in this paper. A series of camera lucida diagrams depicting the structure of hairs of 13 species of mammals is presented.

INTRODUCTION

The Project Tiger in Maharashtra was initiated in the Melghat Tiger Reserve on 22nd February, 1974, with the main object of giving protection and conserving the tiger. The present observations are undertaken under Project Tiger with the main aim of studying food and feeding habits on the basis of faeces mainly of the carnivores. McMurtrie (1886) was probably the first to study structural patterns of hairs.

The practical applications of hair identification in the biological and forensic sciences have been enumerated by several workers (Mathik 1938, Williams 1938, Mayer 1952) and Adorjan and Kolenosky (1969). However, except for studies reported by Koppiker & Sabnis (1976) on structural identification of hairs of some mammals of Maharashtra, no detailed investigations have been

reported on patterns of hair structure in Indian Mammals in general and that of Maharashtra in particular. The present paper embodies further information on hair structure of some remaining mammals of Maharashtra. The hair studies undertaken so far under Project Tiger cover in all 34 mammalian species.

MATERIAL AND METHODS

All hair specimens were directly washed in hot water. They were air dried thoroughly and passed through ether and xylol. Hair slides were prepared in Canada-balsam. The camera lucida drawings were prepared of each hair showing cuticular, and medullar pattern. The three basic regions of each hair fibre namely, proximal, medial and distal were studied. The diagrams on the left hand side in the figures show the structure of hairs of the proximal end (except in Figure 9 which shows the structure of entire hair when seen visually), in the middle the medial and on the right the distal end.

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IDENTIFICATION OF HAIRS

OBSERVATIONS

In cases where the structure of proximal and medial portions of hair was identical, only one diagram has been drawn representing both. The measurements given are averages. Magnification of the figures is $\times 740$.

The structural parts of a hair are the cuticle, cortex, medulla, pigment and hair cells. In the system of hair identification to be outlined

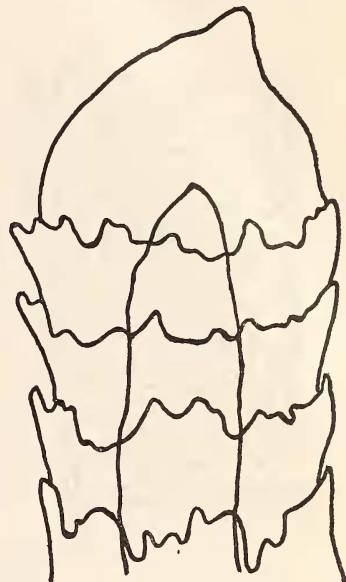
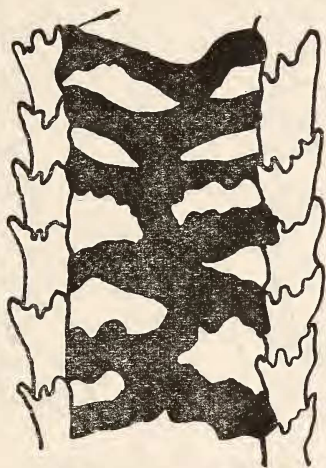


Fig. 1. Giant Squirrel (*Ratufa indica*)

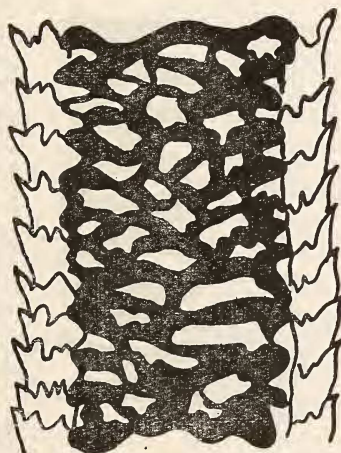


Fig. 2. Flying Squirrel (*Petaurista petaurista*)

only cuticle and medulla are important. The structure of these patterns which form the basis of hair identification under study are given below according to order and family of the specimens.

GIANT SQUIRREL *Ratufa indica*

Fig. 1

Gross Appearance:

Length 3.2 cm. The hairs differ in colour. Some are chocolate brown in colour and others

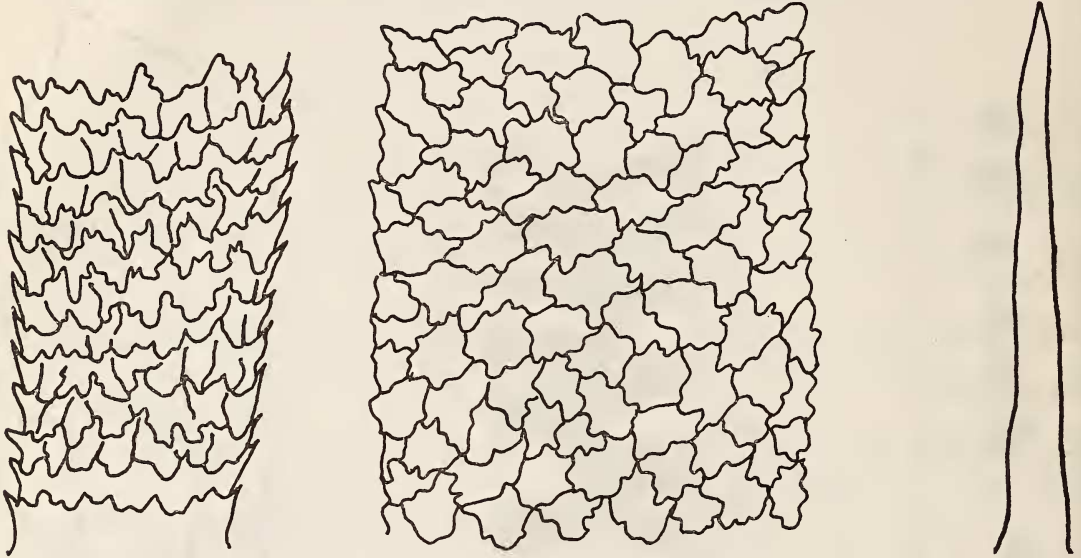


Fig. 3. Indian Porcupine (*Hystrix indica*)

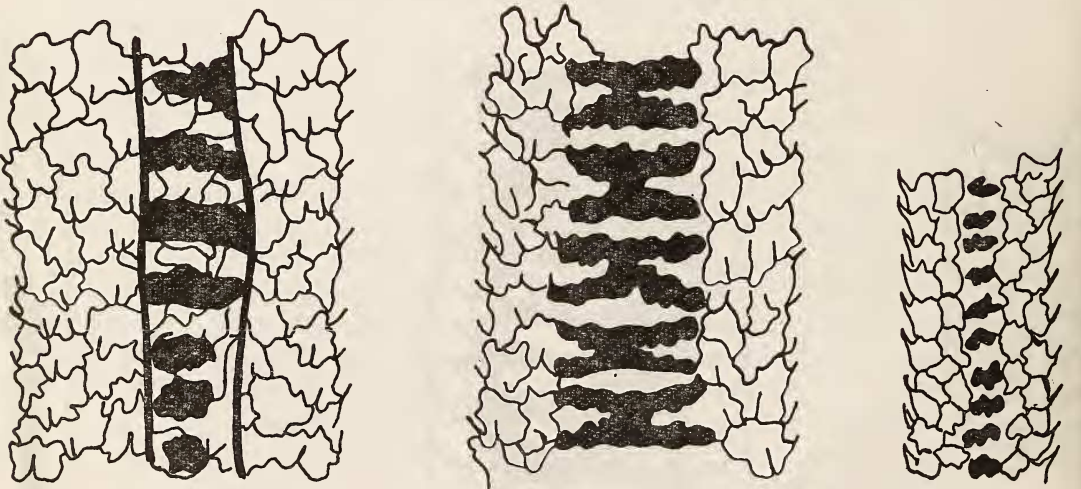


Fig. 4. Wild Dog (*Cuon alpinus*)

IDENTIFICATION OF HAIRS

are half yellow and half black. They measure 60 μ in diameter in the proximal region.

Microscopic Appearance:

Scales coronal with serrate edges in proximal region. In the medial region border ap-

pears serrate, while it is coronal with serrate margins at the distal end. In the proximal region medulla is discoidal type, in the medial fragmented with criss-cross arrangements. In the distal region the medulla is continuous.

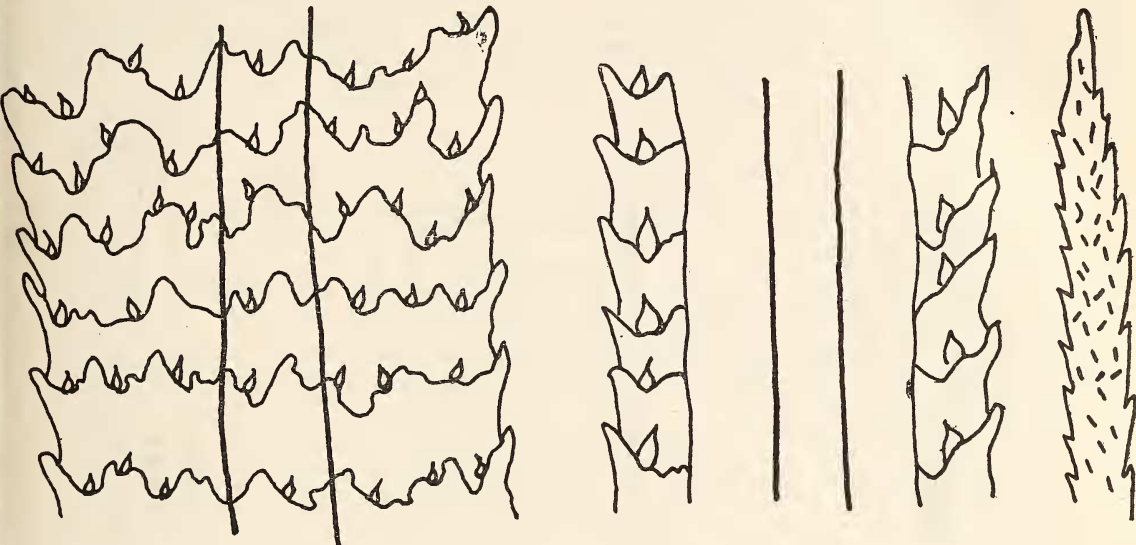


Fig. 5. Sloth Bear (*Melursus ursinus*)

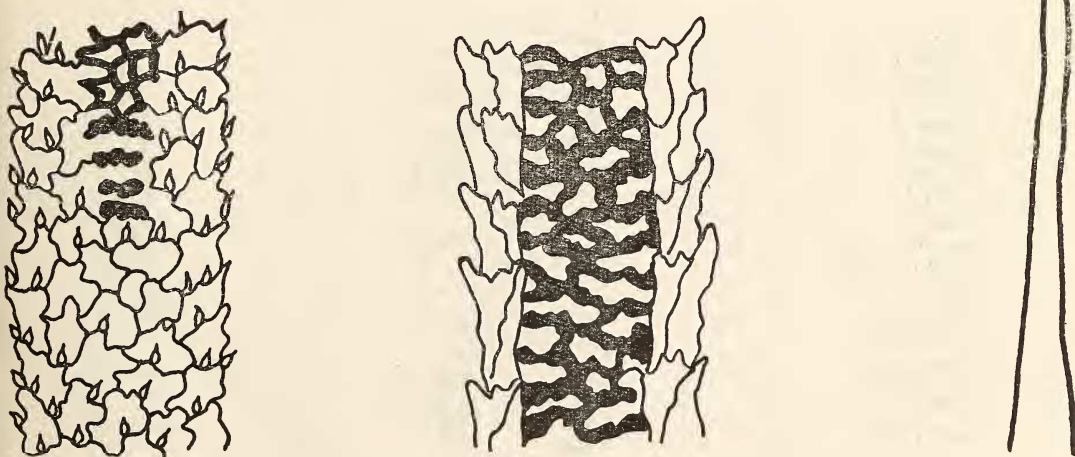


Fig. 6. Leopard Cat (*Felis bengalensis*)

FLYING SQUIRREL *Petaurista petaurista*

Fig. 2

Microscopic Appearance:

The scales are coronal with serrate edges in the proximal and medial region. The border of the distal region appears spiny and the tip of the hair also has spiny appearance. In the proximal and medial region medulla appears fragmented with arrangement like that of lattice work. In the distal region the medulla is of continuous type.

Gross Appearance:

Length 1.8 cm. The colour of the hair in the proximal region is black, in the medial region brownish yellow while in the distal region it is black, giving it a banded appearance. The hair measures 51 μ in diameter in the proximal region.

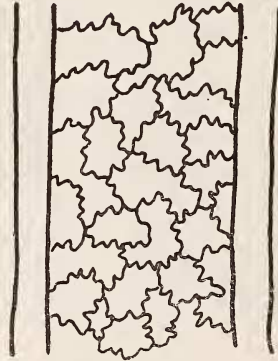


Fig. 7. Rusty-spotted Cat (*Felis rubiginosa*)

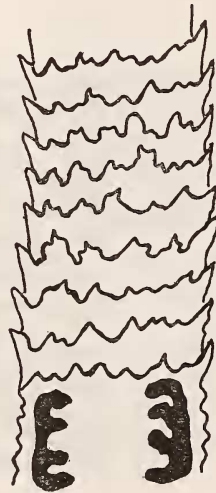


Fig. 8. Desert Cat (*Felis libyca*)

IDENTIFICATION OF HAIRS

INDIAN PORCUPINE *Hystrix indica*

Fig. 3

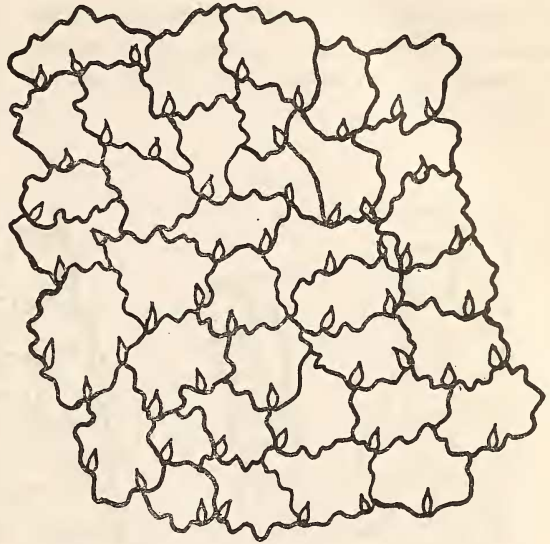
Gross Appearance:

Length 2.1 to 3.5 cm. The hairs appear spiny

and are very stiff. The hair measures 102 μ in diameter. The hair is narrow at the proximal end, becoming broader in the medial region and tapers in the distal region. They are



Entire hair



Proximal

Fig. 9. Indian Wild Boar (*Sus scrofa*)

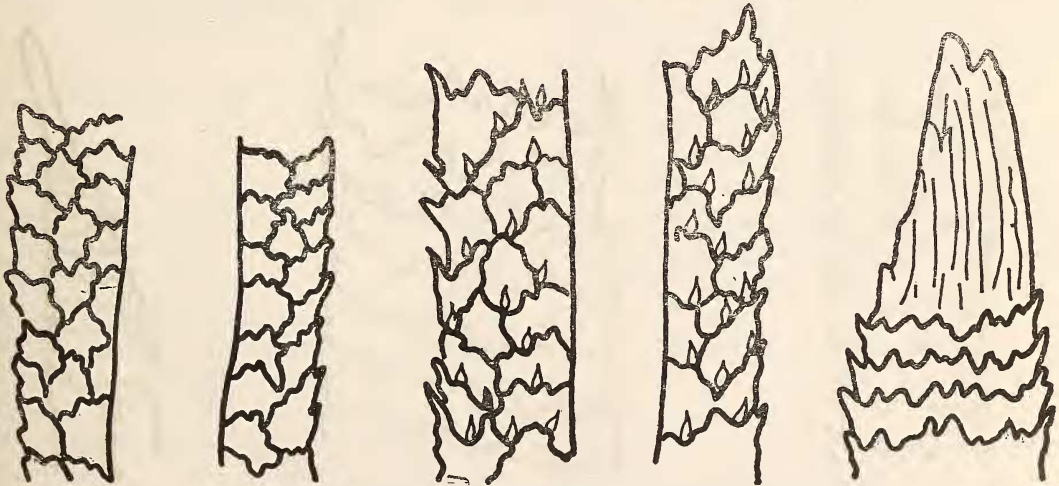


Fig. 10. Gaur or Indian Bison (*Bos gaurus*)

grayish in colour with black tip.

WILD DOG *Cuon alpinus*

Microscopic Appearance:

Fig. 4

The scales are coronal with serrate edges in the proximal region which gradually become imbricate with serrate edges in the medial region. In the distal region the border appears plain with pointed tip. The medulla is continuous throughout the length of the hair.

Gross Appearance:

Length 3 to 5 cm. They measure 48μ in the proximal region. The colour of the hair in the proximal region is white, in the middle yellow white, in the distal half it is brown ending with a black tip.

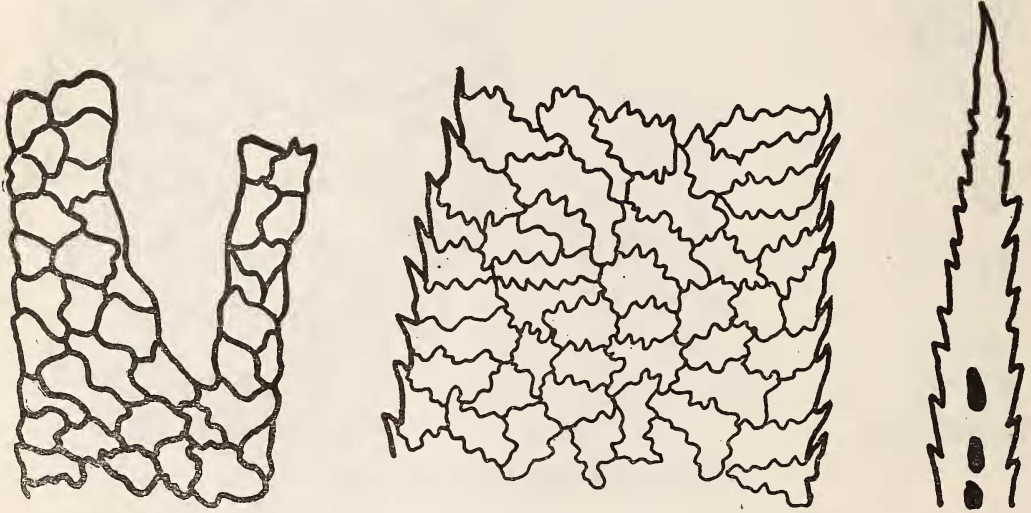


Fig. 11. Fourhorned Antelope or Chowsingha (*Tetracerus quadricornis*)

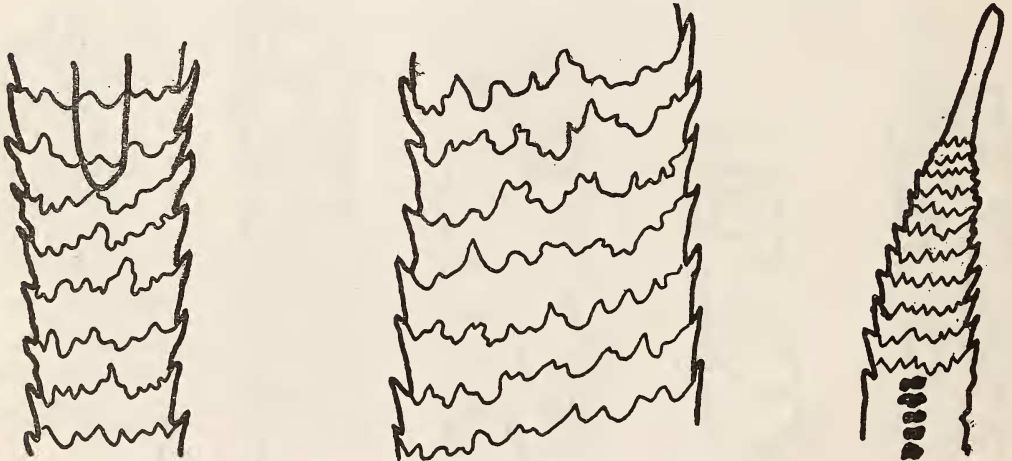


Fig. 12. Indian Chevrotain or Mouse Deer (*Tragulus meminna*)

Microscopic Appearance:

Though scales are imbricate with crenate edges in the proximal and medial region, the border of the scales give out spines intermittently. In the distal region the border of the hair appears spiny with imbricate flattened scales. The medulla is fragmented in the proximal and distal end while in the medial region it is discoidal having an appearance similar to that of capital H.

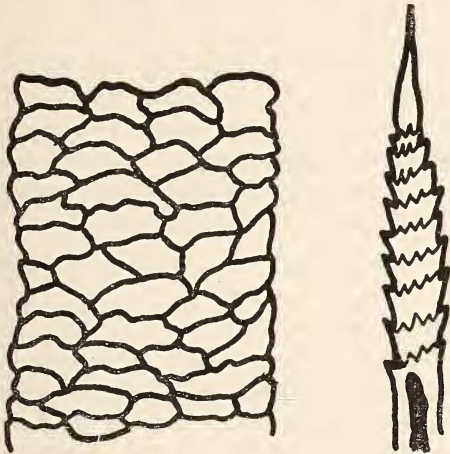


Fig. 13. Indian Gazelle or Chinkara (*Gazella gazella*)

SLOTH BEAR *Melursus ursinus*
Fig. 5

Gross Appearance:

Length 17.4 to 19.5 cm. The hairs are black in colour. They measure 96 μ in diameter in the proximal region.

Microscopic Appearance:

Scales are coronal with dentate edges in the proximal region. In the medial region the border of the hair has spines with dentate margins, while the distal region has spiny border. The medulla is continuous in the proximal and medial region. In the distal region medulla is not visible.

LEOPARD CAT *Felis bengalensis*

Fig. 6

Gross Appearance:

Length 2.2 to 2.8 cm. The hair has banded appearance. The basal region is greyish in colour, medial region black while distal half is yellow gradually turning black in the 1/3 portion of the distal region of the hair. They measure 39 μ in diameter in the proximal region.

Microscopic Appearance:

In the proximal region the scales are imbricate with serrate edges giving it a spiny appearance. In the medial region border appears dentate while in the distal region it appears plain. In the proximal region medulla appears fragmented but in the medial region it is fragmented giving lattice appearance. In the distal region medulla is not visible.

RUSTY SPOTTED CAT *Felis rubiginosa*

Fig. 7

Gross Appearance:

Length 2.3 cm. The colour of the hair is grayish in the proximal region, black in the middle and brown in the distal region. In some hairs the proximal region is grayish followed by white band and distal third region is black. They measure 30 μ in the proximal region.

Microscopic Appearance:

Scales are coronal with serrate edges in the proximal region. In the medial region the scales appear imbricate with serrate borders while in the distal region the borders appear plain. The medulla is discoidal in proximal and distal region and continuous in the medial region.

DESERT CAT *Felis libyca*

Fig. 8

Gross Appearance:

Length 1.6 cm. Hair stems are soft. The diameter at proximal region is 18 μ . The colour of the hair is white and black in proximal re-

gion, gradually becoming yellowish brown in the medial region, and in the distal region it is black.

Microscopic Appearance:

Scales are coronal with serrate margin in the proximal and distal region of the hair. They are coronal dentate in the medial region. Medulla is discoidal in the proximal region, in the medial region fragmented and arranged in two rows. Medulla is not visible in the distal region.

INDIAN WILD BOAR *Sus scrofa*

Fig. 9

Gross Appearance:

Length 7.5 to 9 cm. The colour of the hair is black, with grayish tip which is frayed. Hair stems are harsh and rigid with a diameter of 144 μ at the proximal region.

Microscopic Appearance:

Scales are imbricate with crenate margin with intermittent spines in the proximal region gradually becoming flattened compressed type in the medial and distal region. The medulla is continuous all throughout.

GAUR *Bos gaurus*

Fig. 10

Gross Appearance:

Length 5 to 6.3 cm. Hair stems are slightly curved measuring 93 μ in diameter in the proximal region. The colour of the hair is brown except for the terminal 1/3 portion which is black.

Microscopic Appearance:

Scales are imbricate with serrate edges in the proximal region, in the medial region imbricate dentate with intermittent spines and coronal serrate in the distal region. The medulla is continuous throughout.

FOUR HORNED ANTELOPE

Tetracerus quadricornis

Fig. 11

Gross Appearance:

Length 1.2 to 2.5 cm. Narrow in the proximal region becoming broader in the medial and tapering off in the distal region. They measure 72 μ in diameter in the proximal region. The colour of the hair is white upto the proximal region, gradually changing to light brown in the apical region.

Microscopic Appearance:

Scales imbricate with plain borders in the proximal region. In the medial region scales are imbricate with serrate edges. The tip of the distal region appears spiny. Medulla is continuous in the proximal and medial region and is fragmented in the distal region.

INDIAN CHEVROTAIN *Tragulus meminna*

Fig. 12

Gross Appearance:

Length 3 to 4 cm. Hair stems are slightly wavy. The diameter at proximal region is 45 μ . The colour of the hair is white in the proximal region, brown in the medial region and the distal tip is black, with a short 1 mm white band preceding it.

Microscopic Appearance:

Scales are coronal with serrate edges throughout. Medulla appears continuous in the proximal and medial region and is fragmented in the distal region.

INDIAN GAZELLE OR CHINKARA *Gazella gazella*

Fig. 13

Gross Appearance:

Length 0.8 to 1.2 cm. The hairs look slightly curved and are more or less equal in diameter throughout except for the gradual taper at the

apex. The diameter at the proximal region measures 60 μ . The colour of the hair is white in the lower half region and brown in the upper half.

Microscopic Appearance:

Scales are imbricate and flattened ovate type in the proximal and medial region. In the distal region the scales are coronal serrate type. Medulla is continuous all throughout.

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